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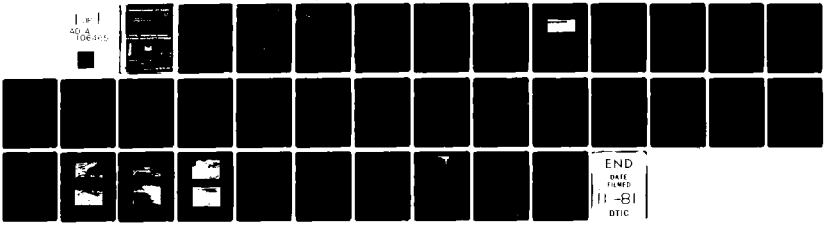

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Bauman Dam - No Name 381 (MO 20240) Jackson County, Missouri	5. TYPE OF REPORT & PERIOD COVERED (9) Final Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Black & Veatch, Consulting Engineers	8. CONTRACT OR GRANT NUMBER(s) (15) DACW43-78-C-0148
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS (12) 361
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101	12. REPORT DATE August 1978 13. NUMBER OF PAGES Approximately 30
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) (10) Dwarka P. /Gupta Bruce A. /Ainsworth Harry L. /Callahan	15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

(6) National Dam Safety Program. Noname 381 Dam (MO 20240), Missouri - Kansas City Basin, Jackson County, Missouri. Phase I Inspection Report.

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety, Lake, Dam Inspection, Private Dams

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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MISSOURI-KANSAS CITY BASIN

NONAME 381
JACKSON COUNTY, MISSOURI
MO 20240

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY: U.S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

AUGUST 1978

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

SUBJECT: No Name 381 Dam (Mo. 20240), Phase I Inspection Report

This report presents the results of field inspection and evaluation of the No Name 381 Dam:

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

1) Spillway will not pass 50 percent of the Probable Maximum Flood.

2) Overtopping could result in dam failure,

3) Dam failure significantly increases the hazard to loss of life downstream.

SUBMITTED BY: SIGNED
Chief, Engineering Division

5 JAN 1979
Date

APPROVED BY: SIGNED
Colonel, CE, District Engineer

8 JAN 1979
Date

NO NAME 381

JACKSON COUNTY, MISSOURI

MISSOURI INVENTORY NO. 20240

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

PREPARED BY:

BLACK & VEATCH
CONSULTING ENGINEERS
KANSAS CITY, MISSOURI

UNDER DIRECTION OF

ST. LOUIS DISTRICT CORPS OF ENGINEERS

FOR

GOVERNOR OF MISSOURI

AUGUST 1978

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam	No Name 381 Dam
State Located	Missouri
County Located	Jackson County
Stream	Tributary to Oil Creek
Date of Inspection	29 August 1978

No Name 381 Dam was inspected by a team of engineers from Black & Veatch, Consulting Engineers for the St. Louis District, Corps of Engineers. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers and developed with the help of several Federal and State agencies, professional engineering organizations, and private engineers. Based on these guidelines, this dam is classified as a small size dam with a high downstream hazard potential. According to the St. Louis District, Corps of Engineers failure would threaten the life and property of approximately three families downstream of the dam and would potentially cause appreciable damage to two improved roads and one unimproved road. The estimated damage zone extends 2 miles downstream of the dam.

Our inspection and evaluation indicates the spillway does not meet the criteria set forth in the guidelines for a dam having the above size and hazard potential. The spillway will only pass 10 percent of the probable maximum flood without overtopping, which is less than the estimated 100-year flood. Considering the small volume of water impounded, the large flood plain downstream, the three houses, two improved roads and one unimproved road downstream, one-half the probable maximum flood is the appropriate spillway design flood.

Deficiencies visually observed by the inspection team were erosion on the upstream slope and the lack of an emergency spillway.

There were no observed deficiencies or conditions existing at the time of the inspection which indicated an immediate safety hazard. Future corrective action and regular maintenance will be required to prevent additional erosion on the embankment which could lead to the development of potential safety hazards. A detailed report discussing each of these deficiencies is attached.

Dwarka P. Gupta

D. P. Gupta, PE
Missouri E-17479

Bruce A. Ainsworth

Bruce A. Ainsworth, PE
Missouri E-18023

Harry L. Callahan

Harry L. Callahan, Partner
Black & Veatch

OVERVIEW OF LAKE AND DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NO NAME 381

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SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the District Engineer of the St. Louis District, Corps of Engineers, directed that a safety inspection of the No Name 381 Dam be made.

b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams". These guidelines were developed with the help of several Federal agencies and many State agencies, professional engineering organizations, and private engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances.

(1) The dam is an earth structure located in southwestern Jackson County, Missouri. Topography of the contributing watershed is characterized by rolling hills. Farming is the major use of land in the watershed. Topography in the vicinity of the dam is shown on Plate 2.

(2) A concrete shaft spillway is located near the middle of the dam and discharges at the toe of the downstream embankment. The spillway inlet is about 25 feet upstream of the crest of the dam.

(3) Pertinent physical data are given in paragraph 1.3.

b. Location. The dam is located in the southwestern portion of Jackson County, Missouri, as indicated on Plate 1. The lake formed by the dam is shown on the United States Geological Survey 7.5 minute series quadrangle map for Belton, Missouri in the northwest 1/4 of Section 31 of T47N, R32W.

c. Size Classification. Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1c above. Based on these criteria, the dam and impoundment are in the small size category.

d. Hazard Classification. The hazard classification assigned by the Corps of Engineers for No Name 381 Dam is as follows: No Name 381 Dam has a high hazard potential, meaning that the dam is located where failure may cause loss of life and serious damage to homes; agricultural, industrial and commercial facilities; and important public utilities, main highways or railroads. For No Name 381 Dam, the flood damage zone extends 2 miles downstream of the dam. Within the damage zone are three houses, two improved roads, and one unimproved road.

e. Ownership. The dam is owned by Arthur Bauman; 8658 E. 150 Hwy; Grandview, Missouri 64030.

f. Purpose of Dam. The dam forms an 11-acre lake used to supply water to livestock.

g. Design and Construction History. The inspection team was unable to locate design data for the dam. The dam reportedly was constructed in 1962.

h. Normal Operating Procedure. Normal rainfall, runoff, transpiration, and evaporation all combine to maintain a relatively stable water surface elevation.

1.3 PERTINENT DATA

a. Drainage Area - 178 acres.

b. Discharge at Damsite.

(1) Normal discharge at the damsite is through an uncontrolled shaft spillway.

(2) Estimated experienced maximum flood at damsite - unknown.

(3) Estimated ungated spillway capacity at maximum pool elevation - 150 cfs (top of dam).

c. Elevation (Feet Above M.S.L.).

(1) Top of dam - 1003.7 ± (see Plate 3)

(2) Spillway crest - 1002.7

(3) Streambed at centerline of dam - 983 ±

(4) Maximum tailwater - unknown.

d. Reservoir. Length of maximum pool - 700 feet ±

e. Storage (Acre-feet).

(1) Top of dam - 99 (from 1973 inventory)

(2) Design Surcharge - not available

f. Reservoir Surface (Acres).

(1) Top of dam - 13

(2) Spillway crest - 11

g. Dam.

(1) Type - earth embankment

(2) Length - 660 feet

(3) Height - 23 feet maximum

(4) Top width - 14 feet (varies)

(5) Side Slopes - varies (see Plate 4)

(6) Zoning - unknown.

(7) Impervious Core - unknown.

(8) Cutoff - unknown.

(9) Grout curtain - unknown

h. Diversion and Regulating Tunnel - none.

i. Spillway.

(1) Type - shaft (see paragraph 3.1c)

(2) Diameter of shaft - 36 inch

(3) Crest elevation - 1002.7 feet m.s.l.

(4) Gates - none

(5) Upstream Channel - none

(6) Downstream Channel - Broken limestone and shale. Side slopes one-quarter mile downstream of dam are typical of streams in the area.

j. Regulating Outlets - none.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No design data were found to be readily available.

2.2 CONSTRUCTION

The dam was reportedly constructed in 1962. No additional construction data were available.

2.3 OPERATION

The maximum recorded loading on the dam is unknown.

2.4 EVALUATION

a. Availability. No engineering data were found.

b. Adequacy. No engineering data were available to make a detailed assessment of design, construction, and operation. Seepage and stability analyses comparable to the requirements of the guidelines were not available which is considered a deficiency. These seepage and stability analyses should be performed for appropriate landing conditions and made a matter of record.

c. Validity. No engineering data were available to determine the validity of the design, construction, and operation.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. A visual inspection of No Name 381 dam was made on 29 August 1978. The inspection team included professional engineers with experience in dam design and construction, hydrology - hydraulic engineering, and structural engineering. Specific observations are discussed below. No observations were made of the condition of the upstream face of the dam below the pool elevation at the time of the inspection.

b. Dam. The inspection team observed the following items at the dam. Some erosion was noted on the upstream embankment which had no slope protection. The horizontal and vertical alinements were very irregular. This irregularity may be attributed to post construction repairs and enlargement. Sliding, cracking, or seepage were not observed at the time of inspection. The embankment was observed to be in generally good condition except an emergency spillway had not been provided. Geologic features which affect the engineering aspects of the site, such as type of rock, jointing, solution activity, and bedding, were not observed nor found at the time of inspection.

c. Appurtenant Structures. The spillway is a 36 inch diameter vertical concrete pipe which discharges through a 30 inch diameter concrete pipe located at the toe of the downstream embankment.

d. Reservoir Area. Heavy sedimentation was observed all around the shoreline of the lake.

e. Downstream Channel. Spillway discharge flows through a 30 inch diameter concrete pipe exiting at the toe of the embankment, then to a natural streambed channel. Heavy vegetation and mild slopes typical of streams in the area characterize the area downstream of the spillway.

3.2 EVALUATION

None of the conditions observed are significant enough to indicate a need for immediate remedial action or a serious potential of failure.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

No controlled outlet works exist. The pool is primarily controlled by rainfall, runoff, evaporation, and capacity of the uncontrolled spillway.

4.2 MAINTENANCE OF DAM

Maintenance performed was unknown.

4.3 MAINTENANCE OF OPERATING FACILITIES

No controlled outlet works exist.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

The inspection team is not aware of any existing warning system for this dam.

4.5 EVALUATION

Existing erosion observed on the upstream side of the dam increases the potential for failure and warrants regular monitoring and control.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. No as-built drawings or design calculations were available.

b. Experience Data. The drainage area and lake surface area are developed from the USGS Belton Quadrangle Map. The spillway and dam layout are from surveys made during the inspection.

c. Visual Observations.

(1) The concrete shaft spillway is in good condition. Although there was no riprap at the outlet of the spillway, the discharge channel appeared in good condition with little erosion.

(2) The spillway and exit channel are located near the middle of the dam. Spillway releases will not endanger the integrity of the dam.

d. Overtopping Potential. The spillway will not pass 50 to 100 percent of the probable maximum flood, which is the spillway design flood recommended by the guidelines, without overtopping. The probable maximum flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The spillway will pass 10 percent of the probable maximum flood, which is less than 100-year flood estimated by procedures established by the USGS in "Technique For Estimating the Magnitude and Frequency of Missouri Floods". According to the recommended guidelines from the Department of Army, Office of the Chief of Engineers, a high hazard dam of small size should pass 50 to 100 percent of the probable maximum flood. The portion of the estimated peak discharge of the probable maximum flood overtopping the dam would be 3,100 cfs of the total discharge from the reservoir of 3,200 cfs. The estimated duration and maximum depth of overtopping are 7.2 hours and 2.5 feet, respectively. The portion of the estimated peak discharge of 50 percent of the probable maximum flood overtopping the dam would be 1,100 cfs of the total discharge from the reservoir of 1,200 cfs. The estimated duration and maximum depth of overtopping are 5.8 hours and 2.0 feet, respectively. Failure of upstream water impoundments shown on the 1975 revised USGS map would not have a significant impact on the hydrologic or hydraulic analysis.

According to the St. Louis District, Corps of Engineers, the effect from rupture of the dam could extend approximately 2 miles downstream of the dam. There are three inhabited homes, two improved roads, and one unimproved road downstream of the dam which could be severely damaged and lives could be lost should failure of the dam occur.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Visual observations of conditions which affect the structural stability of this dam are discussed in Section 3, paragraph 3.1b.

b. Design and Construction Data. No design data relating to the structural stability of the dam were found.

c. Operating Records. No operational records exist.

d. Post Construction Changes. No post construction changes exist which will affect the structural stability of the dam.

e. Seismic Stability. The dam is located in Seismic Zone 1 which is a zone of minor seismic risk. A properly designed and constructed earth dam using sound engineering principles and conservatism should pose no serious stability problems during earthquakes in this zone.

The seismic stability of an earth dam is dependent upon a number of factors: The important factors being embankment and foundation materials and shear strengths; abutment materials, conditions, and strength; embankment zoning; and embankment geometry. Adequate descriptions of embankment design parameters, foundation and abutment conditions, or static stability analyses to assess the seismic stability of this embankment were not available and therefore no inferences will be made regarding the seismic stability. An assessment of the seismic stability should be included as part of the stability analysis required by the guidelines.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. The only item of concern noted during the visual inspection which should be monitored or controlled was the presence of severe erosion along the upstream face of the dam.

b. Adequacy of Information. Due to the lack of engineering design data and drawings the conclusions in this report were based only on performance history and visual conditions. The inspection team considers that these data are sufficient to support the conclusions herein. However, seepage and stability analyses are needed to satisfy the requirements of the guidelines.

c. Urgency. A program should be developed as soon as possible to monitor at regular intervals and correct the deficiency described in this report. The remedial measures recommended in paragraph 7.2 could be accomplished now or delayed until observations of this monitoring program and/or the recommendation of a qualified engineer indicate the necessity of action. If the safety deficiency listed in paragraph 7.1a is not corrected, it will continue to deteriorate and lead to a serious potential of failure. Presently, immediate action is not considered necessary.

d. Necessity for Phase II. The Phase I investigation does not raise any serious questions relating to the safety of the dam or identify any serious dangers that would require a Phase II investigation.

e. Seismic Stability. This dam is located in Seismic Zone 1. Because stability analyses are not available, the seismic stability of the dam cannot be assessed. An assessment of the seismic stability should be included as part of the stability analysis required by the guidelines.

7.2 REMEDIAL MEASURES

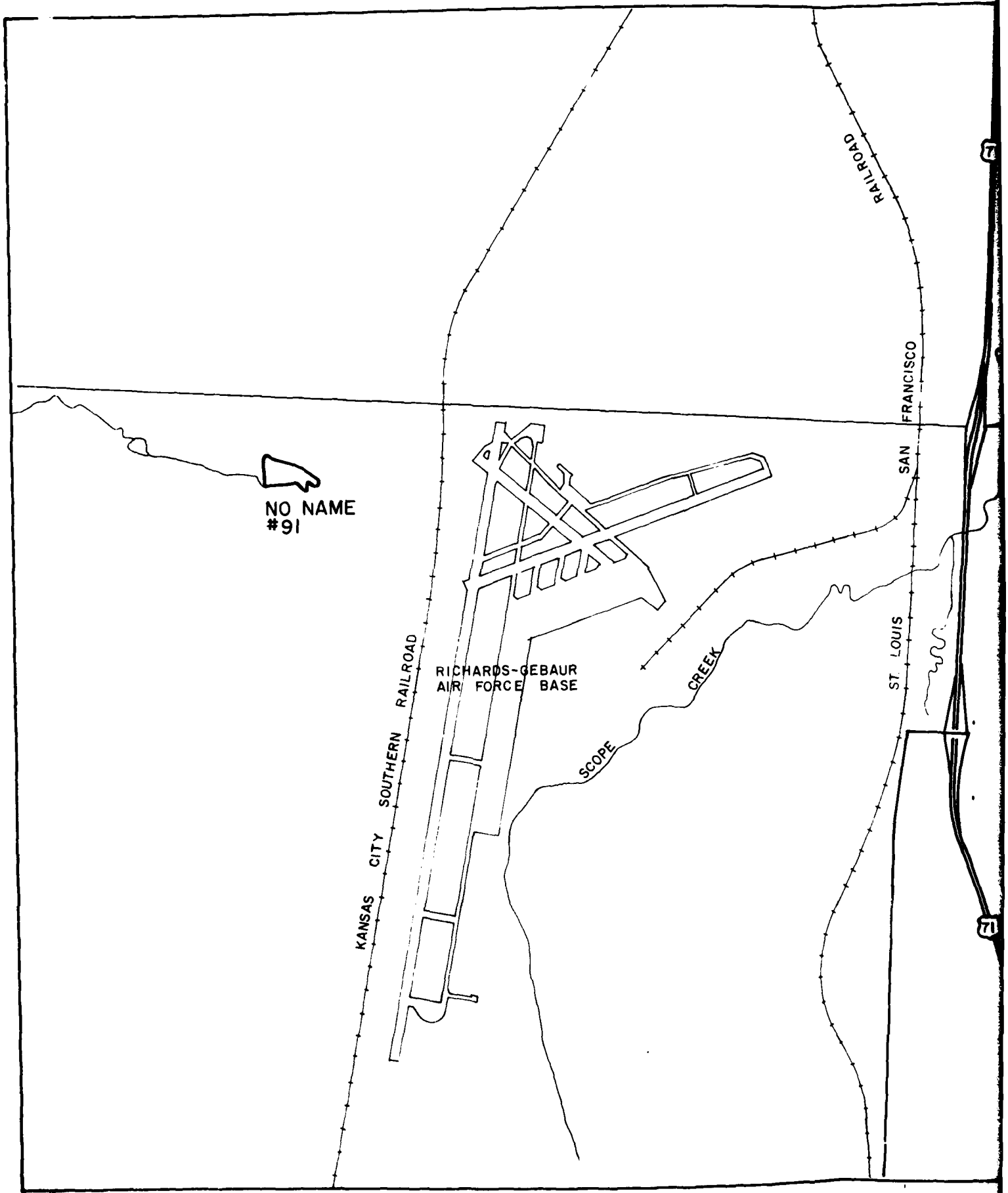
a. Alternatives. The spillway will pass 10 percent of the probable maximum flood. In order to pass 50 percent of the probable maximum flood as required by the Recommended Guidelines, the spillway capacity and/or height of dam would need to be increased.

b. O&M Maintenance and Procedures. The following O&M maintenance and procedures are recommended:

(1) Erosion should be repaired and riprap added on the upstream face to prevent additional erosion.

(2) A detailed inspection of the dam should be made at least every year by an engineer experienced in design and construction of dams. More frequent inspections may be required if items of distress are observed other than those already mentioned.

(3) Seepage and stability analyses should be performed by a professional engineer experienced in the design and construction of dams.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RICHARDS-GEBAUR
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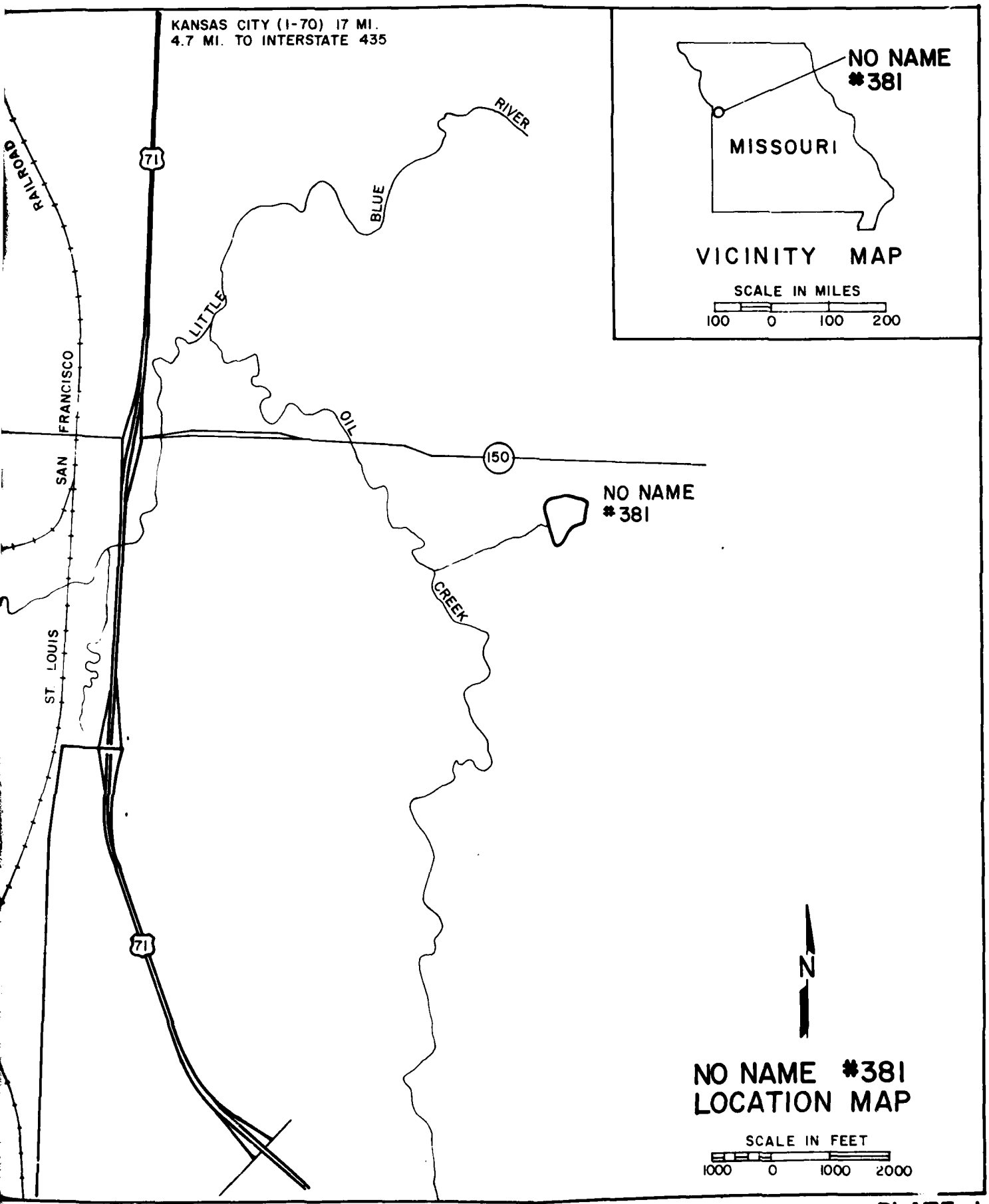
KANSAS CITY SOUTHERN RAILROAD
SCOPE CREEK
ST. LOUIS SAN FRANCISCO RAILROAD
71
71


KANSAS CITY (I-70) 17 MI.
4.7 MI. TO INTERSTATE 435
RAILROAD
71
BLUE
RIVER
LITTLE
OIL
SAN FRANCISCO
150
NO NAME
#381
CREEK
ST LOUIS
71
NO NAME
#381
MISSOURI
VICINITY MAP
SCALE IN MILES
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NO NAME #381
LOCATION MAP
SCALE IN FEET
1000 0 1000 2000

PLATE 1


Blue River
Lumpkins
WASHINGTON
NO NAME #381
Golf Course
Trailer Park
JACKSON CO
CASS CO
19
30
29
31
32
150
BM
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VICINITY TOPOGRAPHY
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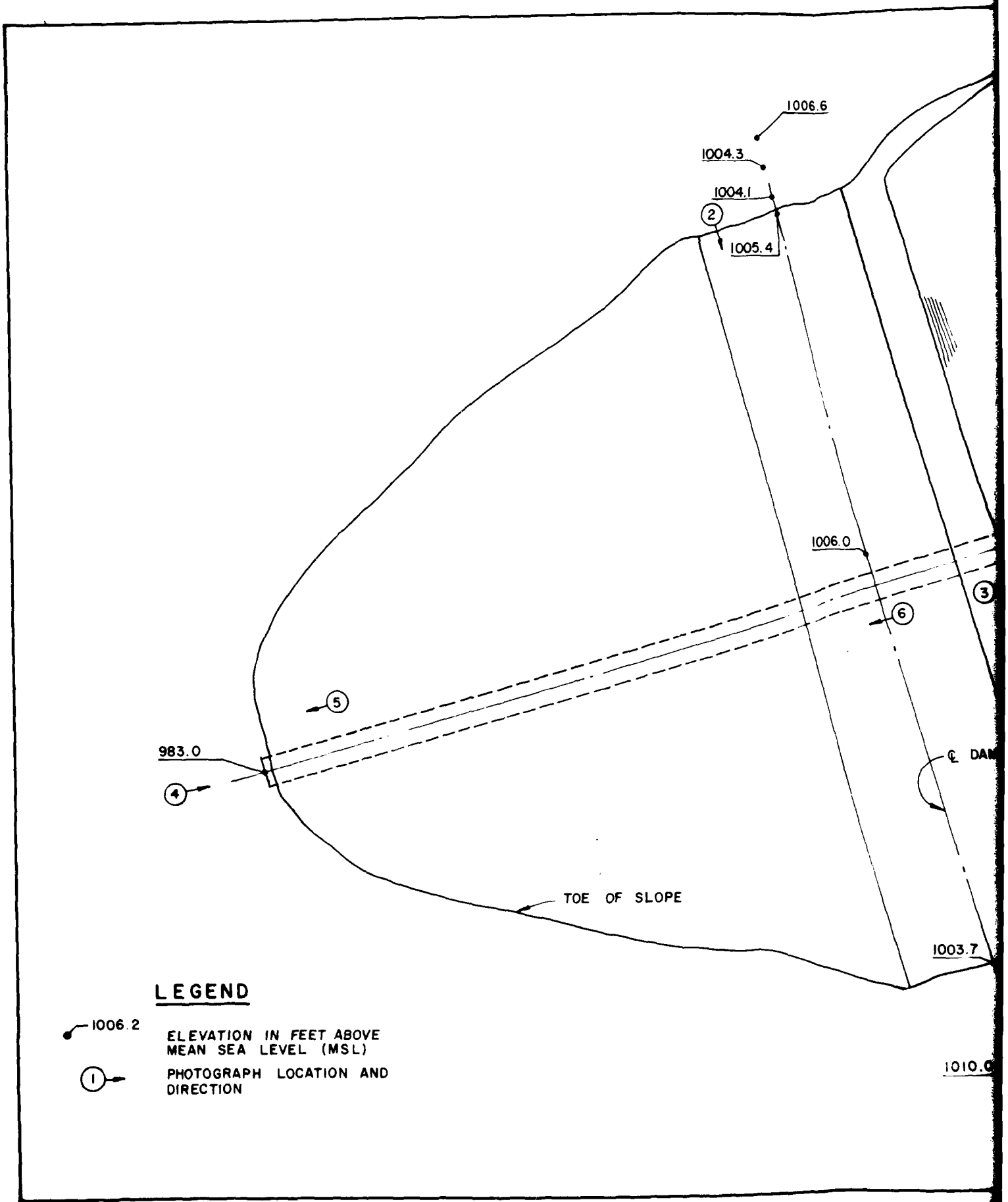
PLATE 2



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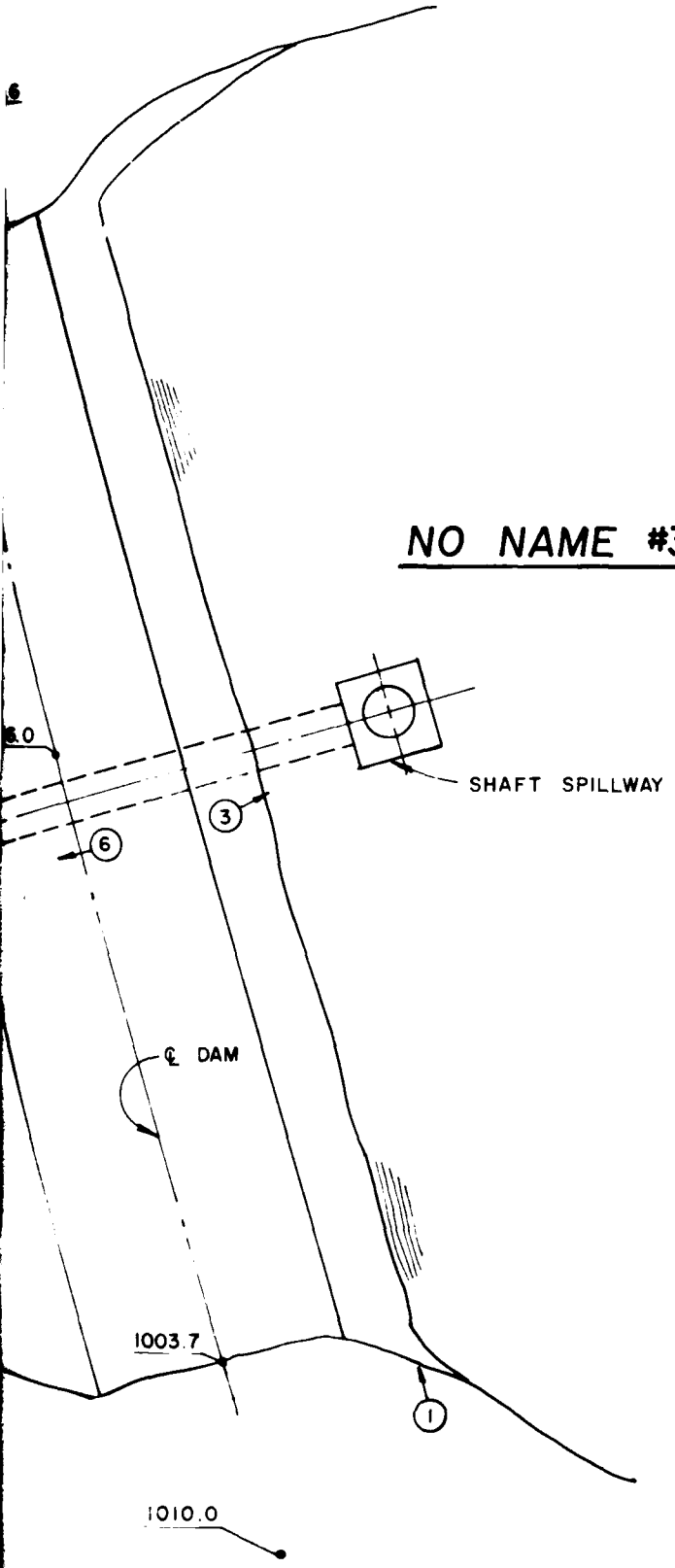
1006.2 — ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL)

(1) — PHOTOGRAPH LOCATION AND DIRECTION



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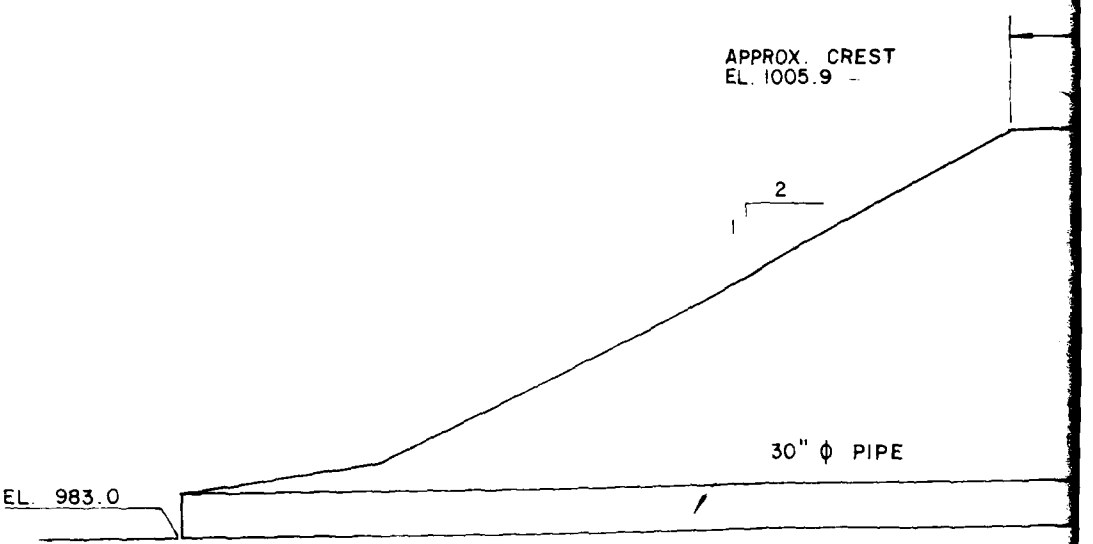
PLAN

PLATE 3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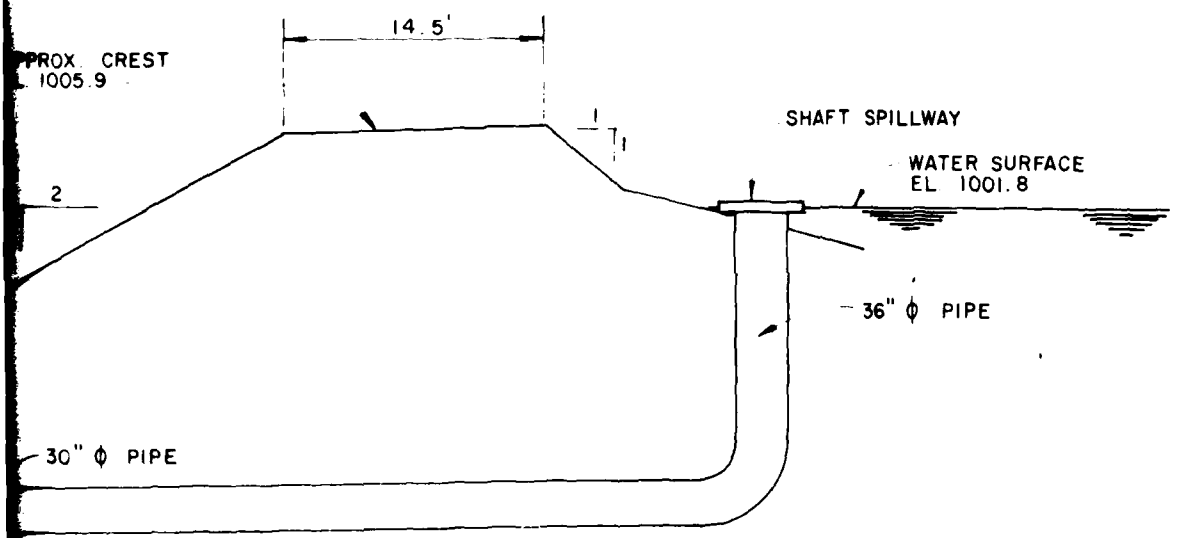


NO NAME #381
CROSS SECTION

PLATE 4

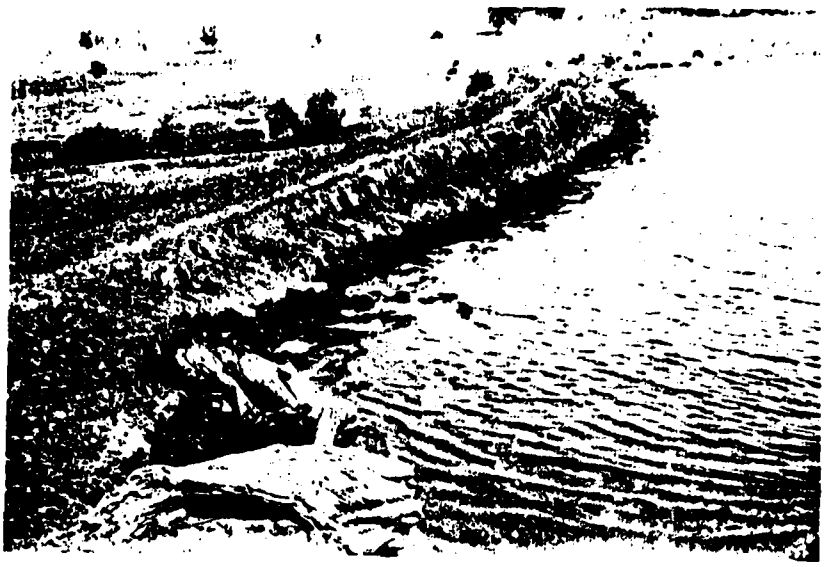


PHOTO 1: UPSTREAM FACE OF DAM (LOOKING NORTH)

PHOTO 2: DOWNSTREAM FACE OF DAM (LOOKING SOUTH)

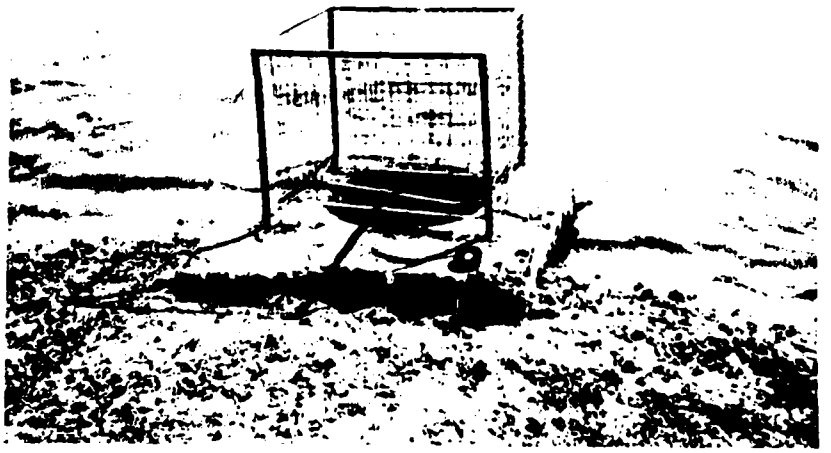


PHOTO 3: SHAFT SPILLWAY INLET

PHOTO 4: SHAFT SPILLWAY OUTLET

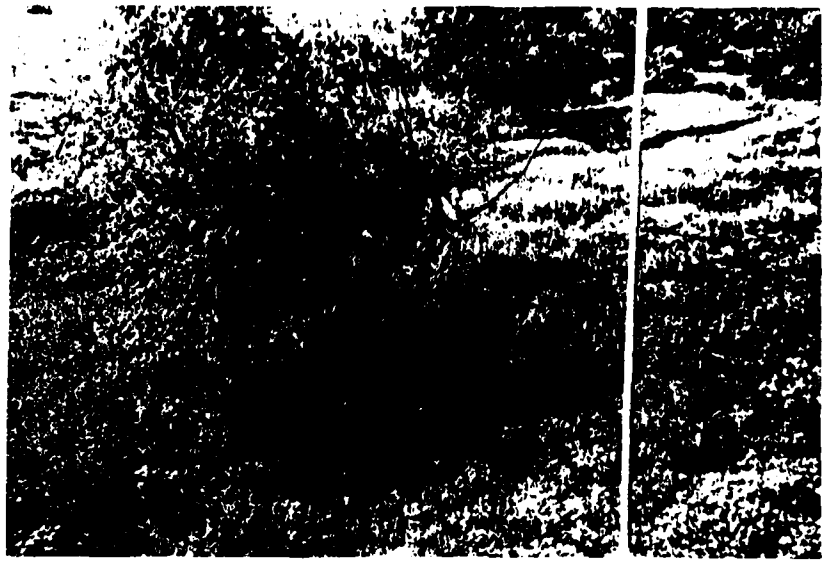


PHOTO 5: DISCHARGE CHANNEL (LOOKING DOWNSTREAM)

PHOTO 6: DOWNSTREAM VALLEY

APPENDIX A

HYDROLOGIC COMPUTATIONS

HYDROLOGIC COMPUTATIONS

1. The Soil Conservation Service (SCS) dimensionless unit hydrograph and HEC-1 (1) were used to develop the inflow hydrograph (see Plate A-1). Hydrologic inputs are as follows:

   a. Twenty-four hour, probable maximum precipitation determined from U.S. Weather Bureau Hydrometeorological Report No. 33:

      200 square mile, 24 hour rainfall - 24.8 inches

      10 square mile, 6 hour percent of 24 hour 200 square mile rainfall - 106%

      10 square mile, 12 hour percent of 24 hour 200 square mile rainfall - 122%

      10 square mile, 24 hour percent of 24 hour 200 square mile rainfall - 131%

   b. Drainage area = 178 acres.

   c. Time of concentration: $Tc = (11.9 \times l^3/H)^{0.385} = .25$ hours = 15 minutes

   d. Losses were determined in accordance with SCS methods for determining runoff using a curve number of 84 and antecedent moisture condition III.

2. Flow over and around the dam and spillway discharges are based on the broad-crested weir equation and the sharp crested circular weir equation.

   Broad-crested weir equation:

   $Q = CLH^{1.5}$ (C = varies, L = varies, H is the head on weir).

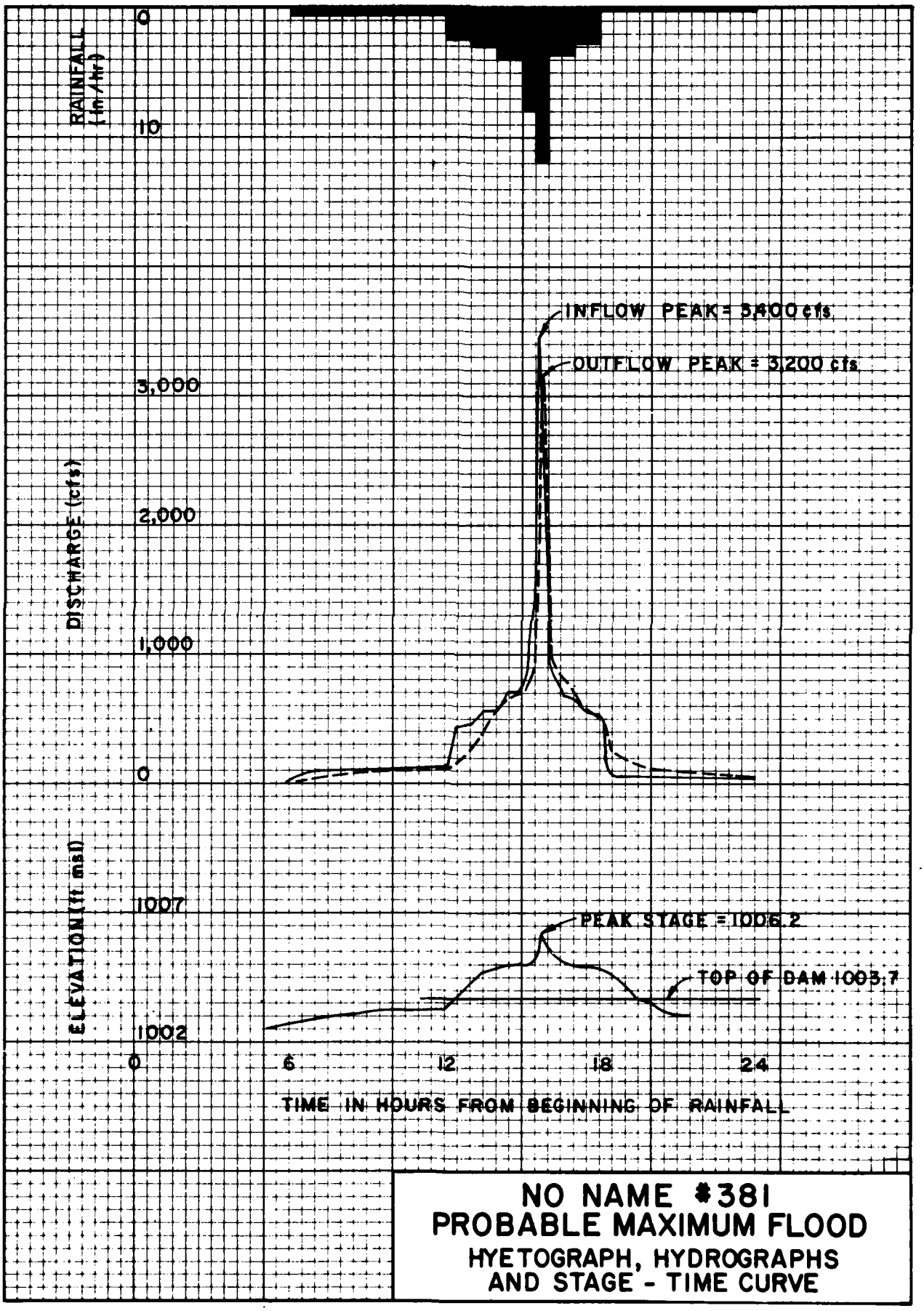
   Circular weir equation:

   $Q = C_o 2\pi R_s (H_o)^{1.5}$ (C_o varies with varying approach depths and types of flow, R_s is the radius of the pipe, H_o is the head on the weir)

3. The elevation-storage relationship was constructed by planimetering the area enclosed within each contour above the normal pool elevation. The storage between two elevations was computed by multiplying the average of the areas at the two elevations by the elevation difference. The summation of these increments below a given elevation is the storage below that level.

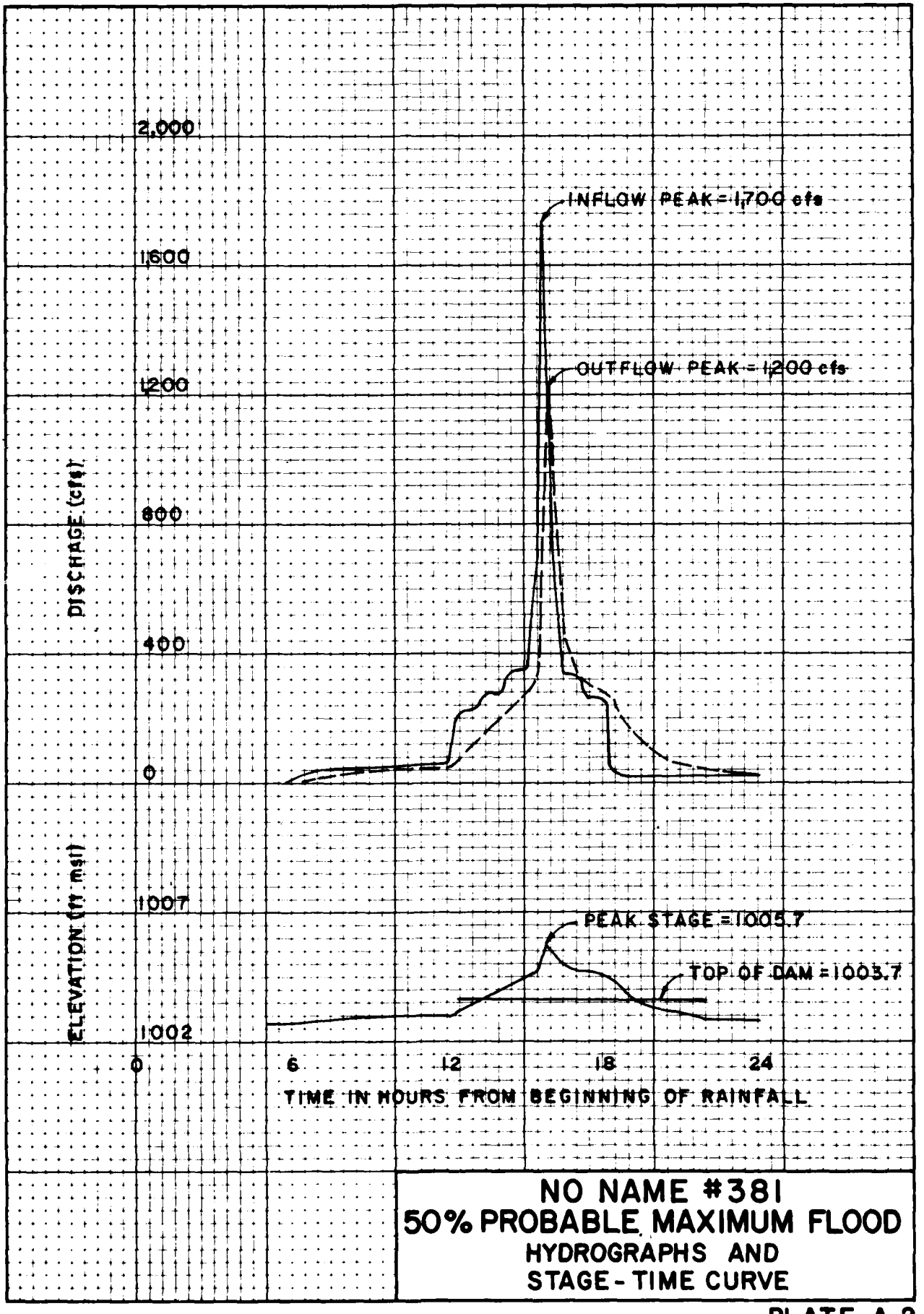
4. Floods are routed through the spillways using HEC-1, with the modified Puls routing method, to determine the capacity of the spillway. Inflow and outflow hydrographs are shown on Plates A-1, A-2, and A-3.

(1) U.S. Army Corps of Engineers, Hydrologic Engineering Center, Flood Hydrograph Package (HEC-1) Dam Safety Version, July, 1978, Davis, California.



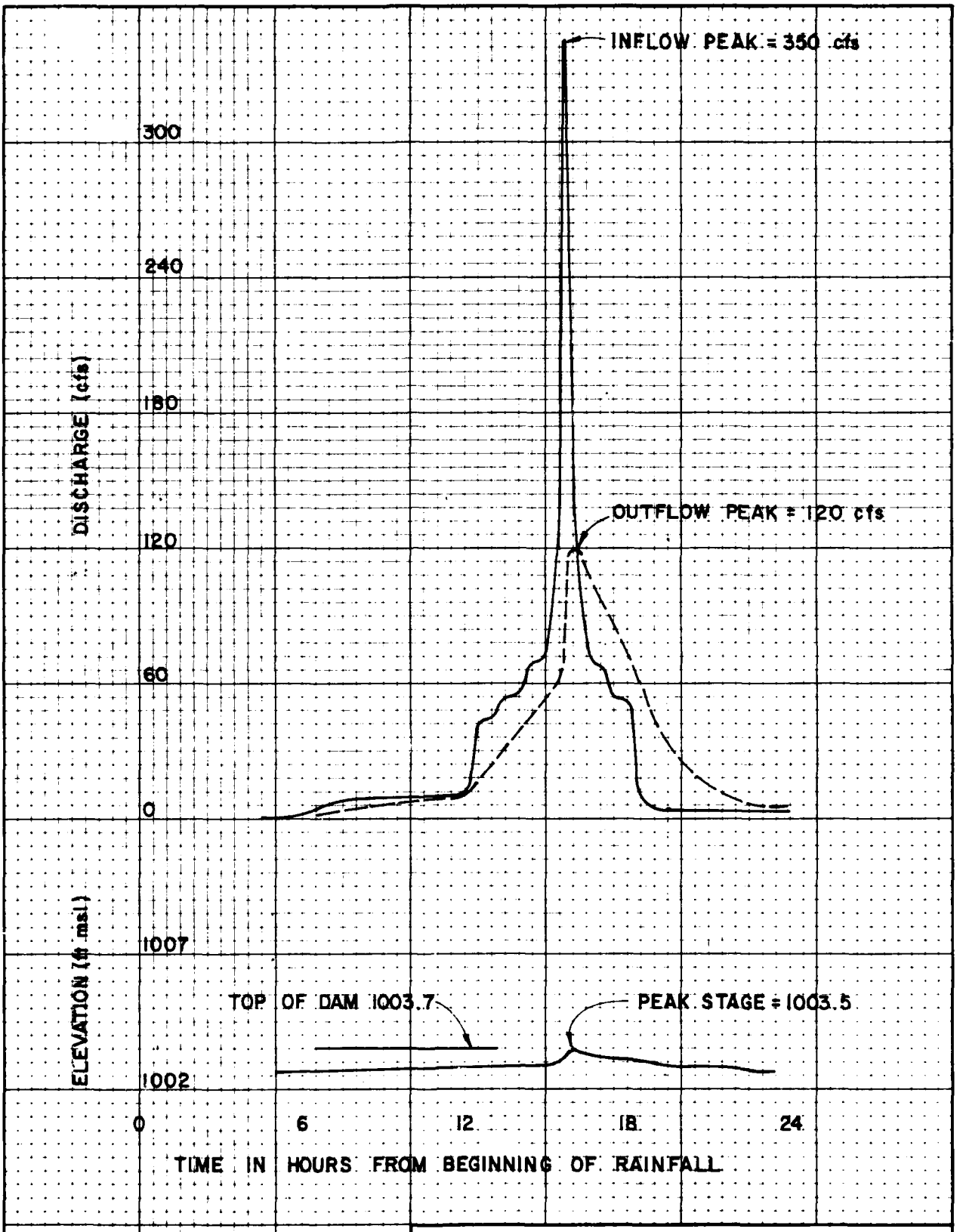
NO NAME #381
PROBABLE MAXIMUM FLOOD
HYETOGRAPH, HYDROGRAPHS AND STAGE - TIME CURVE

PLATE A-1



NO NAME #381
50% PROBABLE MAXIMUM FLOOD
HYDROGRAPHS AND STAGE - TIME CURVE

PLATE A-2



NO NAME #381
10% PROBABLE MAXIMUM FLOOD
HYDROGRAPHS AND STAGE-TIME CURVE

PLATE A-3